MR SULLY UNFOLDS PHYSICS

Efficiency and reducing wasted energy

AQA 4.1.2.1–4.1.2.2
Energy · Paper 1
Foundation & Higher

Name _____ Class _____ Date _____

No device is perfect. **Efficiency** tells you what fraction of the energy put in ends up where you want it.

KEY EQUATION

efficiency = useful output ÷ total input

Use energy (J) or power (W) for both.
Give it as a decimal (e.g. 0.75) or a percentage (75%).
It can never be more than 1 (100%).

WORKED EXAMPLE

A motor takes in 500 J and transfers 400 J usefully.
efficiency = 400 ÷ 500 = **0.8 (80%)**

Section A · Recall and calculate

Grade 4–5

1 What happens to energy that is not transferred usefully? [2]

2 A lamp is supplied with 100 J of energy electrically. It transfers 20 J usefully by light. Calculate its efficiency. [2]

3 Give two ways of reducing unwanted energy transfers. [2]

Section B · Rearrange and apply

Grade 5–6

4 Complete the table. [4]

Total input	Useful output	Wasted	Efficiency
200 J	150 J		
1000 W		650 W	
	100 J		0.25

5 A motor has an efficiency of 0.6 and a useful power output of 300 W. Calculate its input power. [3]

6 Energy is transferred out of a warm house through its walls. Explain how the thickness and thermal conductivity of the walls affect the rate at which the house cools. [3]

Section C · Stretch

Grade 7+

7 Suggest three ways to increase the efficiency of an electric car. Explain each. (Higher) [3]

Exam-style question

AQA style

8 A filament lamp and an LED both produce 9 W of light. The filament lamp has an input power of 60 W. The LED has an efficiency of 0.75.

a Calculate the efficiency of the filament lamp. [2]

b Calculate the input power of the LED. [2]

c Explain why replacing filament lamps with LEDs saves money. [2]

Total: _____ / 25

How confident am I?

	Not yet	Nearly	Got it
I can calculate efficiency as a decimal and a percentage	☐	☐	☐
I can explain how insulation and lubrication reduce waste	☐	☐	☐
I can rearrange the efficiency equation	☐	☐	☐